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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/519,084

12/23/2004

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EXAMINER

CHIU, TSZ K

ART UNIT

PAPER NUMBER

2822

MAIL DATE

DELIVERY MODE

10/01/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/519,084	<b>Applicant(s)</b> WATANABE ET AL.	
	<b>Examiner</b> Tsz K. Chiu	<b>Art Unit</b> 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 21-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21-28, 34-36 and 40 is/are allowed.
- 6) ☒ Claim(s) 29-33 and 37-39 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 29-33, 37-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al. (6844604).

With respect to claim 29, Lee discloses a semiconductor device a stacked gate insulating film (15, for example figure. 2) and a gate electrode (24, for example figure. 2) stacked in this order on a silicon substrate (10, for example figure. 2); wherein

said gate insulating film (15, for example figure. 2) comprises a nitrogen containing high-dielectric-constant insulating film (column 2, lines 12-22) which has a structure in which nitrogen is introduced into metal oxide or metal silicate; and

a nitrogen atom in said nitrogen containing high-dielectric-constant insulating film selectively bonds with a silicon atom in metal silicate (15, For example Fig. 2).

With respect to claim 30, Lee discloses a nitrogen atom which selectively bonds with a silicon atom in said metal silicate (column 2, lines 46-50) is situated at a distance from the silicon substrate (10, For example Fig. 2).

With respect to claim 31, Lee discloses a semiconductor device according to Claim 21, wherein said gate insulating film (15, for example figure. 2) comprises a silicon oxide film (column 8, lines 30-35) formed on said silicon substrate so as to be in

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contact therewith, and said nitrogen containing high-dielectric-constant insulating film (column 2, lines 12-22) formed on said silicon oxide film so as to be in contact therewith.

With respect to claim 32 and 38, Lee discloses a semiconductor device according to Claim 21, wherein said silicon substrate (10, for example figure. 2) and said gate insulating film (15, for example figure. 2) are in contact with each other, and said gate insulating film (15, for example figure. 2) and a gate electrode (24, for example figure. 2) are in contact with each other; and said gate electrode is made of either a polysilicon or a polysilicon germanium conductive film (24, For example Fig. 2).

With respect to claim 33 and 39, Lee discloses the gate insulating film contains at least one type selected from the group consisting of Zr, Hf, Ta, Al, Ti, Nb, Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu (column 8, lines 50-55).

With respect to claim 37, Lee discloses a semiconductor device stacked a gate insulating film (15, for example figure. 2) and a gate electrode (24, for example figure. 2) stacked in this order on a silicon substrate (10, for example figure. 2); wherein

said gate insulating film (15, for example figure. 2) has a layered structure having, from the silicon substrate side (10, for example figure. 2), a first silicon oxide film (column 8, lines 30-35), a metal oxide film or a metal silicate film (24, for example figure. 2) and a second silicon oxide film (column 8, lines 30-35); and

only the second silicon oxide film (column 8, lines 30-35) has a structure in which nitrogen is introduced into silicon oxide (column 2, lines 12-22).

***Allowable Subject Matter***

Claims 21-28, 34-36, 40 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Claim 21 is allowable over the reference of record because none of these references disclose or can be combined to yield the claimed invention of a semiconductor device stacked a gate with gate insulating film comprises a nitrogen containing high-dielectric-constant insulating film a position at which the nitrogen concentration in said nitrogen containing high-dielectric-constant insulating film reaches a maximum in the direction of the film thickness is present in a region at a distance from the silicon substrate.

Claim 34 is allowable over the reference of record because none of these references disclose or can be combined to yield the claimed invention of a semiconductor device stacked a gate with gate insulating film comprises a nitrogen containing high-dielectric-constant insulating film nitrogen is introduced only into a region lying between the position at which the silicon concentration has the minimum value and said gate electrode side interface.

Claim 40 is allowable over the reference of record because none of these references disclose or can be combined to yield the claimed invention of a semiconductor device stacked a gate with gate insulating film comprises a nitrogen containing high-dielectric-constant insulating film a position at which the nitrogen concentration in said gate insulating film reaches a maximum in the direction of the film thickness is present in a region at a distance from the silicon substrate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tsz K. Chiu whose telephone number is 571-272-8656. The examiner can normally be reached on 0800 to 1700.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra V. Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Zandra V. Smith/  
Supervisory Patent Examiner, Art  
Unit 2822

TC